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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|-----------------------|------------------|
| 10/611,805 | 06/30/2003 | Lizhong Sun | AMAT/6877/CMP/CMP/RKK | 5060 |
| 44257 | 7590 | 12/05/2006 | EXAMINER | |
| PATTERSON & SHERIDAN, LLP 3040 POST OAK BOULEVARD, SUITE 1500 HOUSTON, TX 77056 | | | SMITH, NICHOLAS A | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1742 | |

DATE MAILED: 12/05/2006

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/611,805
Filing Date: June 30, 2003
Appellant(s): SUN ET AL.

Steven H. VerSteeg
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11 September 2006 appealing from the
Office action mailed 10 February 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct. The amendment after final rejection submitted on 9 June 2006 has been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,911,619

Uzoh et al.

6-1999

Bard et al., Electrochemical Methods, 1980, John Wiley & Sons, page 86.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-2, 5-9, 11-13 and 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Uzoh et al. (US 5,911,619).

Regarding claim 1, Uzoh teaches (col. 4 line 35 - col. 5 line 21) a method of electrochemically and mechanically planarizing a surface of a substrate, comprising: providing an electrically conductive solution and an electrode in contact with the electrically conductive solution, disposing a polishing medium in contact with the electrically conductive solution, positioning a substrate having a conductive material formed thereon against the polishing medium so that a surface of the substrate contacts the electrically conductive solution and the polishing medium; applying a pulsed DC current to remove conductive material from the substrate and decreasing the current as the thickness of the conductive layer is decreased. The Examiner asserts that the applying the pulsed DC current step combined with decreasing the current as the thickness is decreased would inherently anticipate steps (d) and (e) of claim 1.

Regarding to the ^{limitation of} cancelled claim 4 in claim 1 and claim 5, Uzoh teaches (Fig. 14, col. 5 lines 9-21) that the current would be applied as a pulsed potential with a waveform.

Regarding claim 2, Uzoh teaches (Fig. 11) that the polishing medium would comprise an electrode.

Regarding claim 6, Uzoh teaches (col. 5 lines 41-64) providing relative motion between the substrate and the polishing medium.

Regarding claim 7, Uzoh teaches (Fig. 11) that the polishing medium comprises a conductive portion, and the conductive portion comprises an electrode.

Regarding claims 8-9, Uzoh teaches (col. 5 lines 9-21) providing a pulsed potential, which would inherently be modulated within a predefined range of potentials.

Regarding claim 11, Uzoh teaches (Fig. 11) that the polishing medium comprises a conductive polishing material or a composite of a conductive polishing material disposed in a conventional polishing material.

Regarding claim 12, Uzoh teaches (col. 4 lines 35-54) that the conductive material would be copper.

Regarding claim 13, Uzoh teaches (col. 4 line 55 - col. 5 line 9) further comprising applying a zero potential between the polishing medium and the electrode for a third time period.

Regarding claim 15, Uzoh teaches (Fig. 14b) that the first time period would be greater than the second time period.

Regarding claim 16, the Examiner would consider that one of the pulses of the decreased current would be the third positive pulse between the polishing medium and the electrode for a third time period.

Regarding claims 17-18, Uzoh teaches (Fig. 14, col. 5 lines 9-21) that the current would be applied as a pulsed potential with a waveform, which would include the first, second and third positive potentials.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh as applied to claim 1 above, and further in view of Bard et al. (Electrochemical Methods).

Regarding claim 14, Uzoh does not specify the potential applied. However, it is well known as evidenced by Bard (page 86) that reaction rate is a strong function of potential in electrode reaction. It would have been obvious to one of ordinary skill in the art to select an initial voltage of about 4 volts to 8 volts in to control the rate of the electropolishing reaction as evidenced by Bard. As such, at least one pulse would have such third pulse would have the claimed voltage as the current is decreased with the decreasing thickness of the conductive layer.

Claims 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh as applied to claim 1 above, and further in view of (no secondary reference).

Regarding claim 10, Uzoh does not specify repeating steps (d) and (e). However, the Examiner asserts that mere duplication of steps has no patentable significance unless a new and unexpected result is produced. See MPEP 2144.04 VI B. It would have been obvious to one of ordinary skill in the art to modify the method of Uzoh by repeating steps (d) and (e) because a new and unexpected result would not be produced.

Regarding claim 19, Uzoh teaches applying a third positive or zero potential between the polishing medium and the electrode for a third time period (see the rejection of claims 13 and 17 above). Uzoh does not specify repeating steps (d) and (e). However, the Examiner asserts that mere duplication of steps has no patentable significance unless a new and unexpected result is produced. See MPEP 2144.04 VI B. It would have been obvious to one of ordinary skill in the art to modify the method of

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Uzoh by repeating steps (d) and (e) because a new and unexpected result would not be produced.

(10) Response to Argument

Appellant has argued:

1. Uzoh et al. does not teach, show, or suggest the first positive potential to be a pulsed potential with a waveform in the claimed method of claim 1 (page 9, 2nd paragraph of appeal brief).

a. Uzoh et al. decreases the applied current as the thickness of the layer decreases and therefore the first positive potential in Uzoh et al. is applied for only an instant in time and the potential would continually decrease as the thickness continually decreases.

Therefore the first positive potential of Uzoh et al. is not a first potential with a waveform (page 9, 2nd paragraph of appeal brief).

b. Examiner's statement that "the claims do not specify that each pulse would be exactly the same current as the previous pulse, and such interpretation cannot be inferred from the claim language under the broadest reasonable interpretation" (see Advisory Action mailed July 6, 2006) is respectfully traversed. Inclusion of phrases "a first positive potential" and "a second positive potential" are reasonable interpreted as "a first positive potential" is one potential and "a second positive potential" is another potential. The specification supports that a different reference numeral is give for

each potential (see particularly Figures 10-15 and paragraphs [0066]-[0067]). Therefore Examiner's interpretation is not reasonable (page 9, 3rd paragraph – page 10, 2nd paragraph of appeal brief).

2. Uzoh et al. in view of Bard et al. does not teach, show or suggest claim 14 for at least the reasons stated above in regards to claim 1 (page 11, 2nd paragraph of appeal brief).
3. Uzoh et al. does not teach, show or suggest claims 10 and 19 for at least the reasons stated above in regards to claim 1 (page 11, 5th paragraph of appeal brief).

Examiner's response to these arguments is as follows:

1. Uzoh et al. does teach the first positive potential to be a pulsed potential with a waveform in the claimed method of claim 1. Appellant is reminded that the term "a waveform" is in reference to the shape of a wave. The claims as stated do not include limitations on the number of pulses or the length of time that a "first positive potential" is applied nor details on waveform shape. A reasonable interpretation of the claims would include a single pulse at a first positive potential, followed by another single pulse at a second positive potential. Uzoh et al. anticipates this embodiment as the first pulse would have a different value than the second pulse since the applied current decreases as the thickness of the layer decreases (col. 4, lines 62-66).

- a. Even though the current in Uzoh et al. would decrease continually, a single pulse from Uzoh et al. would meet the claimed limitation of a first positive potential to be a pulsed potential with a waveform.
 - b. Examiner agrees that inclusion of phrases "a first positive potential" and "a second positive potential" are reasonable interpreted as "a first positive potential" is one potential and "a second positive potential" is another potential, especially in light of the specification supports that a different reference numeral is give for each potential (see particularly Figures 10-15 and paragraphs [0066]-[0067]). However, Examiner does not agree that the claims specify that each pulse would be exactly the same current as the previous pulse. For instance, a waveform could reasonably refer to only one pulse. Application of a second potential could also reasonably refer to only one pulse. Therefore, subsequent pulses, first pulse at "a first positive potential" and second pulse at "a second positive potential" would not be exactly the same current and therefore Uzoh et al. anticipates the claims.
2. See reasons stated in 1. for Uzoh et al. anticipating the first positive potential to be a pulsed potential with a waveform.
 3. See reasons stated in 1. for Uzoh et al. anticipating the first positive potential to be a pulsed potential with a waveform.

(11) Related Proceeding(s) Appendix

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No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



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Patent Examiner

Art Unit 1742

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